



INFLUENCE OF PATHOGEN AND PREDACEOUS MORTALITY OF TASAR SILKWORM, *ANTHRAEA MYLITTA* D. IN GONDIA DISTRICT OF VIDARBHA REGION, MAHARASHTRA

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Abstract:

During three consecutive year from 2009-2012 the analysis of pathogenic mortality at larval stages caused significantly high (16.90 – 39.08 %). Among the pathogenic mortality viral pathogens were prominent and causing high mortality (5.14 – 29.52 %) than the bacterial pathogen (02.00 – 23.97 %). The highest predaceous mortality was recorded during cycle II in the year 2009-10 it was 45.38% and lowest mortality 02.06% was recorded during cycle I in the year 2011-12. Among the predaceous mortality, the vertebrate pest infestation is higher during II cycle in the year 2010-11 and it was 29.00 %. The infestation of wasp was zero during cycle I in each year but highest infestation was recorded during cycle II in the year 2009-10 followed by pest sting bug (06.56 %) during same year. This study indicates that, the pathogenic and the predaceous mortality was more prominent in Bondgaon/Devi field of Gondia district of Vidarbha, Maharashtra.

Keywords: Tasar silkworm, *Antheraea mylitta*, pathogen, Pest and Predators, Diseases, Mortality.

Introduction:

The tropical tasar culture is a traditional agro forestry practice to produce unique tasar vanya silk by applying wild silk insect, *Antheraea mylitta* Drury (Lepidoptera : Saturniidae), which provides livelihood, employment and economic support to several aboriginal families of Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Orissa, Maharashtra, Madhya Pradesh, Uttar Pradesh, West Bengal state of the country (R. Mohan Reddy, 2011).

In India about 15 states are engaged in production of non-mulberry silk. Tasar is practiced by about 1, 40,000 families in India (Krishna Rao *et al.*, 1998). In Maharashtra, tasar sericulture is limited to mainly four districts of eastern Vidarbha; Gadchiroli, Chandrapur, Bhandara and Gondia (Yadav *et al.*, 1997, Mathur *et al.*, 2000).

Tasar culture not only checks the destructions of forest but also gives opportunity to utilize the vast natural resources with minimum investment along with huge employment generation for rural community. Tropical tasar silkworm being wild in nature and reared outdoor (forest) in natural conditions on host plant of *Terminalia tomentosa* (Ain) and *T. arjuna* (Arjun). In India, the extent of cocoon crop loss due to the silkworm diseases is nearly 40% (Sahay *et al.*; 2000).

The growth and development of the tropical tasar culture in India is directly dependent on the successful rearing of tasar silkworm and remunerative return to the farmer. Tasar silkworm reared in outdoors directly on the trees thereby they get exposed to

vagaries of climate, pest and predators and diseases outbreak (Singhvi, N. R. *et al.*; 2007).

About 50-55% loss has been recorded due to pest and natural calamities and 30-35% due to diseases (Mathur *et al.*, 1999). About 50 - 55% of the total loss of larvae took place during early stages (I to III) (Bajpeyi *et al.*, 1993). The present study was undertaken to study the influence of pathogenic and the predaceous mortality in Bondgaon/Devi field of Gondia district of Vidarbha, Maharashtra.

Materials and methods:

The influence of pathogens and predaceous mortality of tasar silkworm, *Antheraea mylitta* D. have been studied in Gondia districts of Vidarbha, Maharashtra.

Survey and selection of sites:

The survey was conducted to select the traditionally tasar silkworm rearer sites at the beginning of first cycle of tasar silkworm, *A. mylitta* D. in July 2009 at Bondgaon/Devi field of Gondia district of Vidarbha, Maharashtra for three consecutive years 2009 - 2012.

Rearing:

The diseased free egg laying collected from the Arjuni/ Morgaon grainage centre and rearing of each cycle used 300 Df's. Rearing of tasar silkworm, *Antheraea mylitta* D. ecorace Daba (T. V.) was conducted outdoor in natural forest condition on host plant *Terminalia tomentosa* and *T. arjuna*. Rearing was monitored for different cycles regularly. After completion of rearing in different cycles the mortality at larval stages due to pathogenic and predaceous mortality was calculated and recorded.

Collection and identification of pests, predators and diseases:

The larvae showing external symptoms of diseases were collected and brought to laboratory for identification of pathogen with the help of microscopic examination. Various types of pest and predator were collected with the help of local device, manually and preserved in the 10% formalin for further investigations. The identification of pests and predators were made with the help of taxonomist and reference books. The percent mortality by biotic factors were calculated and analyzed.

Result:

The rearing of tasar silkworm during 2009 – 2012 was undertaken by farmer at Bondgaon/Devi of Gondia district by using traditional method of rearing. The farmer practiced tasar silkworm rearing for additional source of income. Influence of pathogen and predaceous mortality were recorded.

The farmer took three cycles every year from 2009 - 2012. During the survey it was observed that 38,250 larvae reared in the first cycle (July – Aug) and about 55.39 % larval mortality was occurred during 2009-10 whereas in 2010 - 11, the mortality was 25.46 % and during 2011 - 12 it was 37.06 % due to the total Pathogenic and Predaceous (Table-1 and Fig-1). Among that highest pathogenic mortality was recorded during 2011-12 it was 35.00 % followed by during 2009-10 and 2010-11 it was 30.06 and 19.87 % respectively (Fig- 2). The predaceous mortality contribute 25.33 % in the year 2009-10 which was higher mortality as compare 2010-11 and 2011-12 it was 5.59 and 2.06 respectively. Among the predaceous mortality vertebrate pest contribute 15.66 and 6.53 % mortality recorded by sting bug infestation in the year 2009-10 and zero infestation occur by wasp (Table- 1 and Fig- 3). In the year 2010-11 the 24,150 larvae reared and bacterial pathogen contributes 15.73 % mortality. Due to viral infection the higher mortality was 25.00 % and bacterial 16.99 % during 2011-12 and 2009-10 respectively (Table – 1 and Fig- 2).

During second cycle (Sep – Oct) 60,900 larvae reared from the year 2010-11 and pathogenic and predaceous mortality contributed 39.08 and 37.76 % respectively which was less as compared to previous cycle. In the second cycle rate of mortality was higher by predaceous mortality as compared to first cycle. The rate of incidence of sting bug and reduviid bug was negligible during cycle I as

compare to cycle II and III (Table-1 and Fig-1, 2 & 3).

In the third cycle (Nov – Jan) 79,200, 38,950, and 61,250 larvae brushed during 2009-10, 2010-11 and 2011-12 respectively. Above 50.00 % total biotic mortality was recorded. Which was higher as compare to cycle I and lower than cycle II (Table- 1 and Fig- 1). Among the biotic mortality the predaceous mortality was also higher as compare to cycle I and lower as compare to cycle II. The incidence of wasp and sting bug was prominent during cycle II and III. Zero incidence of reduviid bug occurred during all cycle in the year 2011-12. However higher viral mortality was recorded during cycle III in the year 2010-11 as compare to cycle I and II during same year as well as previous and next cycle in same year (Table – 1 and Fig-1, 2 and 3).

Discussion:

The tasar silk is produced by *A. mylitta* D. a wild polyphagous tropical sericigenous insect feeds primarily on *T. tomentosa*, *S. robusta* and *T. arjuna* in addition to tertiary food plants (Sinha *et al.*, 1992). Tasar rearing being outdoor, there is a certain extent of cocoon loss due to parasites, predators and vagaries of nature.

In the present study, an attempt has been made to study the influence of pathogen and predaceous mortality during rearing of *A. mylitta* and cocoon production at the study sites, Bondgaon/Devi of Gondia district.

In the present study the viral pathogen was most prominent during all rearing season as compare to bacterial pathogen. Rathod *et al.* (2010) reported that the influence of abiotic and biotic factors on mortality of tasar silkworm, *A. mylitta* D. in Gondia districts and reported abundance of viral pathogens more prevalent caused greater extent of mortality in the larval population, during all the three cycles of the year.

In the present study the incidence and mortality due to various diseases indicated that weather dependent disease occurrence. The traditional farmers encountered disease more with virus followed by bacteria. The tasar silkworm, *A. mylitta* is susceptible to various pathogenic organisms that cause diseases and higher mortality in the larval population Sen *et al.*, (1969).

The crop loss due to this disease is estimated around 20%. In tropical tasar the crop loss due to the bacteriosis is to the tune of 10 - 15% (Sahay *et al.*, 2000).

Shiva Kumar and Shamitha (2013) studied larval mortality due to disease, pests and predator in outdoor and indoor rearing of tasar silkworm, *A. mylitta*, they reported that, 80 -90 % larval mortality in outdoor rearing, while it was lower rate of mortality in indoor rearing as compared to outdoor rearing due to minimal attack of pests and predator and loss due to rainfall.

In present study the predaceous mortality was high in cycle II as compare to cycle I and III. These finding very close to Sharma *et al.* (2004) reported the bug population increase in second crop of *A. mylitta* as compared to first crop when the average temperature, humidity and rainfall ranged from 22 to 33 °C, 62 to 92% and 33.60 to 451.72 mm, respectively, during the two seasons.

In the present study pests and predators were more in the month of July and their population reduced in the month of August. They reappeared again in September and persisted up to December. The cycle of the pests and parasitoids was well synchronised with the cycle

of tasar silkworm. The parasitisation was high during third cycle might be due to prolonged larval duration in winter. These observations are in accordance with previous observations of Shaffer (1983).

Conclusion:

It is concluded that the tasar silkworm rearing conducted outdoor directly on the natural forest hence they get exposed to climatic conditions, pests, predators and diseases. In addition to this owing to lack of proper technical knowledge, traditional rearers face the pathogenic and predaceous mortality more prominent throughout the year in Bondgaon/Devi field of Gondia districts of Vidarbha region Maharashtra.

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Table: 1. Mortality recorded during different season in tasar silkworm, *A. mylitta* at Bondgaon/Devi (Gondia) during 2009 -12.

Year	No. Of Larvae Reared (300 Dfl's)	Total Pathogenic And Predaceous Mortality (%)	Pathogenic and Predaceous Mortality (%)							
			Pathogenic Mortality(%)			Predaceous Mortality (%)				
			Viral	Bact.	Total	Wasp	Sting Bug	Redu Bug	Vert. Pest	Total
Cycle - I (July – Aug)										
2009-10	38250	55.39	13.07	16.99	30.06	0	6.53	3.13	15.66	25.33
2010-11	24150	25.46	4.14	15.73	19.87	0	0.869	0	4.72	5.59
2011-12	27300	37.06	25.00	10.00	35.00	0	0	0	2.06	2.06
Average	29900	39.30	14.07	14.24	28.31	0	2.46	1.04	7.48	10.99
Cycle - II (Sep – Oct)										
2009-10	60900	65.58	7.88	12.31	20.19	9.85	6.56	1.97	26.99	45.38
2010-11	60900	76.84	15.10	23.97	39.08	3.94	2.05	2.13	29.00	37.76
2011-12	55080	58.21	22.00	5.00	27.00	4.00	4.00	0	25.00	31.21
Average	58960	66.876	14.99	13.76	28.75	5.93	4.20	1.36	26.99	38.11
Cycle - III (Nov – Jan)										
2009-10	79200	51.89	14.89	2.00	16.90	2.52	2.77	3.15	26.52	34.98
2010-11	38950	50.83	29.52	4.00	33.53	2.00	2.31	3.08	9.91	17.30
2011-12	61250	56.61	15.00	7.00	22.00	5.00	2.00	0	27.61	34.61
Average	59800	53.11	19.80	4.33	24.14	3.17	2.36	2.07	21.34	28.96

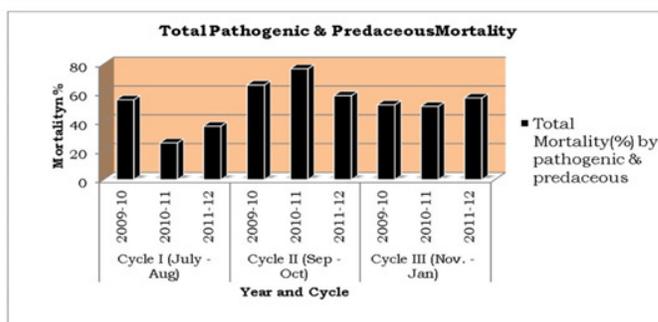


Figure : 1. Graph Showing Total Pathogenic and Predaceous Mortality during different season in tasar silkworm, *A. mylitta* at Bondgaon/Devi (Gondia) during 2009 -12.

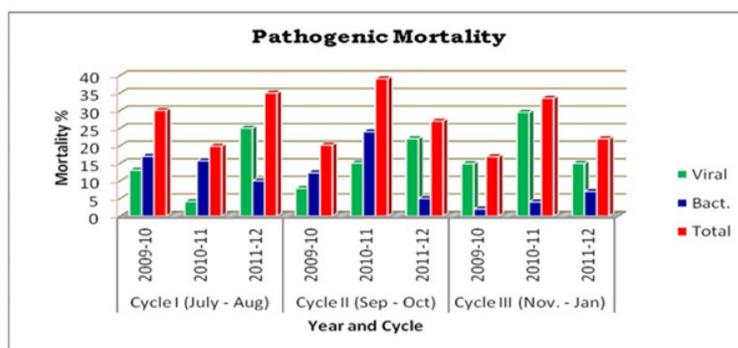


Figure : 2. Graph Showing Pathogenic Mortality during different season in tasar silkworm, *A. mylitta* at Bondgaon/Devi (Gondia) during 2009 -12.

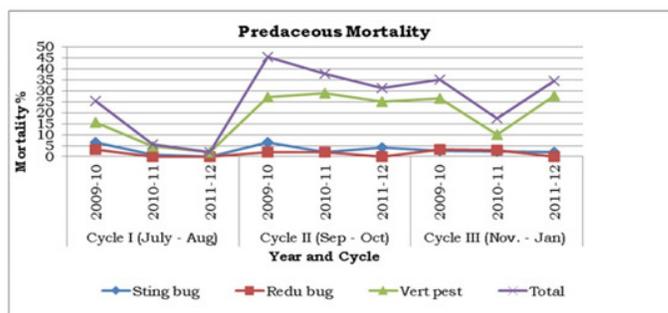


Figure : 3. Graph Showing Predaceous Mortality during different season in tasar silkworm, *A. mylitta* at Bondgaon/Devi (Gondia) during 2009 -12.

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